International Journal of Physical Education, Exercise and Sports
www.physicaleducationjournal.com
Online ISSN: 2664-9896, Print ISSN: 2664-9888
Received: 18-10-2023, Accepted: 03-11-2023, Published: 18-11-2023
Volume 5, Issue 2, 2023, Page No. 23-26

The impact of badges on intrinsic motivation of undergraduate physical education students in a distance learning course

Maria Giannousi[1], Dimitris Marinakis[2], Charalampos Liakos[1], Panagiotis Kapidis[1], Nikolaos Vernadakis[1]
[1] Department of Physical Education and Sports Science, Democritus University of Thrace, University Campus, Komotini, Greece
[2] Department of Nutrition and Dietetics, University of Thessaly, Argonafton, Trikala, Greece

Abstract
The aim of this study was to investigate the effects of gamification on the intrinsic motivation of online undergraduate students at Democritus University of Thrace. Sixty-two (n=62) third-year undergraduate Physical Education students, between the ages of 20-21 years old, were randomly assigned into two teaching method groups: badges group with 32 students and no-badges group with 30 students. For the data collection at the end of this study, students completed an online "interest/enjoyment" subscale of the intrinsic motivation inventory. Independent sample t-test analysis was conducted to examine the hypothesis that online students who receive badges would exhibit higher intrinsic motivation compared to online students in the no badges group. The analysis revealed that the use of badges during distance learning courses has a no significant impact on the intrinsic motivation of undergraduate students. Online students implementing the training program with the use of badges showed similar intrinsic motivation compared to online students who did not use badges. In conclusion, the findings indicate that badges may not necessarily lead to an increase in students' intrinsic motivation. Moreover, badges fell short in fulfilling the need for competence among online learners.

Keywords: Gamification, intrinsic motivation, physical education, students, distance learning

Introduction

Distance education has become increasingly prevalent across all levels of education, experiencing a gradual rise even before the COVID-19 global pandemic (Means, Bakia & Murphy, 2014) [1s]. However, the pandemic significantly accelerated the shift to distance learning in an unforeseen manner. For instance, during the fall 2020 semester at Democritus University of Thrace, among a total of 901 undergraduate courses, 747 are exclusively conducted using distance education, while 125 are partially delivered and involve laboratory-based subjects. Weekly, 120,000 teaching hours are conducted, meeting the requirements of the law for the personal data of the 37,000 users of the University's services. (Michalopoulou, 2022) [2]. While distance education offers numerous opportunities, it comes with substantial challenges. A survey indicated that a primary concern among university students during the transition to online learning was maintaining motivation, cited by 79% of students (Means & Neisler, 2020) [3].

One potential strategy to address motivational challenges in distance education is gamification. Gamification is defined as the intentional incorporation of game design elements, such as badges, leaderboards, points, trophies, and narratives, into non-game contexts to provide a game-like experience to users (Seaborn & Fels, 2015) [4]. The integration of these game design elements, referred to as gamification tools, in educational settings is a relatively recent development that emerged around 2008 (Faiella & Ricciardi, 2015) [5].

In the realm of distance education, gamification has been hailed as a promising approach to tackle the well-documented motivational and performance issues faced by online students (Dichev & Dicheva, 2017 [6]; Means & Neisler, 2020) [3]. Games inherently possess motivational qualities, addressing basic psychological needs like competence, autonomy, and relatedness. Similarly, gamification tools have the potential to fulfill these needs, thereby enhancing the intrinsic motivation and performance of distance learners (Mekler, Brühlmann, Tuch & Opwis, 2017 [7]; Sailer, Hense, Mayr & Mandl, 2017) [8].

The impact of gamification on the intrinsic motivation of users remains a subject of ongoing debate in the gamification literature. Some scholars argue that gamified environments, primarily shaped by gamification tools like badges, points, and trophies, function as extrinsic motivators that resemble performance-contingent rewards, potentially diminishing the intrinsic motivation of learners (Faiella & Ricciardi, 2015 [5]; Hanus & Fox, 2015) [9]. Conversely, other researchers have reported that gamified environments enhance intrinsic motivation (Banfield & Wilkerson, 2014) [10], while some studies suggest no significant positive or negative impact on users' intrinsic motivation (Kyewski & Krämer, 2018 [11]; Mekler *et al*., 2017) [7].

Exploring the impact of gamification on intrinsic motivation necessitates additional research, given the mixed findings in existing studies (Hanus & Fox, 2015 [9]; Mekler *et al*., 2017) [7]. Therefore, the aim of this study was to investigate the effects of gamification on the intrinsic motivation of online undergraduate students at the Democritus University of Thrace. This research seeks to contribute further evidence to the ongoing discourse in the gamification literature. The research question guiding this study was the following:

1. How does a distance learning environment gamified with badges affect online undergraduate students' intrinsic motivation?

Methods

Participants

This study included 62 third-year students from the Department of Physical Education and Sport Science at Democritus University of Thrace. Their ages ranged from 20 to 21 years old (M=20.5, SD=1.05), with 33 males (53.2%) and 29 females (46.8%). The participants were enrolled in the 334–New Technology in Health course during the spring semester of 2021. They were randomly assigned to two teaching method groups: badges group with 32 students (17 males and 15 females) and no-badges group with 30 students (16 males and 14 females). Prior to the assignments, participants were briefed on the study's purpose, their experimental group, the teaching method, and participation obligations. All students in the two classes were invited to participate, but the procedures differed for the two course delivery formats. Each student provided consent to participate, and they were informed that participation was voluntary and would not affect their grades.

Instruments

The "interest/enjoyment" subscale of the Intrinsic Motivation Inventory (Ryan, Mims & Koestner, 1983) [12] served as the self-report measure for intrinsic motivation. This subscale consists of seven items and is widely utilized to assess intrinsic motivation. Responses to items are recorded on a 7-point Likert scale, ranging from 1 (Not at all true) to 7 (Very true). The subscale demonstrates good internal consistency, as indicated by a Cronbach's alpha of 0.78 (McAuley *et al*., 1989) [13].

Open eClass distance course

A brief distance learning setting utilizing a badges tool was established within Open eClass, an asynchronous learning management system. This condensed distance course comprised a welcome module, four learning modules, one survey module, and one final module for all participant groups. The welcome module was tailored for each group, providing an introduction to the study requirements and instructions on navigating the Open eClass system. Each of the four learning modules included educational content and a quiz related to the content, and these modules were consistent across all participant groups.

Distinct course designs were devised for each group within Open eClass, employing the badges gamification tool. In Open eClass, badges are digital images granted upon achieving specific milestones in the system. Two groups were established: the "badges" group, which earned badges during the study, and the "no-badges" group (control group), which did not receive any badges. Various badge types were configured to correspond to different activities in Open eClass. Although obtaining a badge is relatively straightforward initially, the difficulty increases as users advance in the system.

This study utilized four badge categories: learning badges, test badges, perfectionism badges, and survey badges. Learning badges were awarded for completing modules, test badges for passing module tests, and perfectionism badges for achieving test scores of 90% or higher. Survey badges were granted upon participants completing the single survey administered throughout the study.

Procedure

Undergraduate students enrolled in the N334 – New Technology in Health course during the spring semester of 2021 were invited to participate in the study. Upon obtaining their informed consent through Google Forms, participants were randomly assigned to either of the two study groups. Additionally, participants voluntarily enrolled themselves in the Open eClass platform.

Upon logging into Open eClass, participants were required to commence with the welcome module as their initial step. The badges group participants were notified in the welcome modules that they would receive badges upon completing specific activities, such as module completion or surveys. In contrast, the no-badges group did not receive any badges during the study, as the badge system was deactivated for this group.

Following the welcome module, participants progressed to Step 2, where they were required to finish the four learning modules. Each learning module comprised educational content and a quiz. Participants were instructed to read the provided content and then take the quiz. The quizzes, consisting of ten multiple-choice questions created by the researchers, necessitated participants to answer at least seven questions correctly to pass. In case of failure, participants were permitted to retake the quizzes as many times as they wished. Successful completion of the learning content and the associated test deemed a learning module finished.

After finishing Step 2, participants progressed to subsequent steps. Step 3 involved the survey, where the interest/enjoyment survey was gathered. The final module, Step 4, conveyed to participants that they had concluded the study. Participants were expected to complete the study within four weeks of enrolling in Open eClass. In case of non-completion, reminder emails were sent by the researcher through the system. Furthermore, upon completing the study, participants were awarded a grade by the researcher.

Statistical analysis

The experiment was a factorial design with teaching method group (badges, no-badges) as independent variable, and intrinsic motivation as dependent variable. Independent samples t-test analysis was conducted to investigate the differences of intrinsic motivation among the teaching method groups (badges, no-badges) of the participants. The hypothesis of this study was:

H01. Online students who receive badges will have higher intrinsic motivation than online students in the no badges (control) group.

Results

The participants' intrinsic motivation was assessed using the interest/enjoyment subscale of the Intrinsic Motivation Inventory as a self-report measure (Ryan *et al*., 1983) [12]. The composite score for each participant was calculated by averaging the items in the interest/enjoyment subscale. The interest/enjoyment subscale demonstrated strong internal consistency, with a Cronbach’s alpha of 0.89 for this study.

An independent samples t-test was applied to examine the H01 hypothesis that online students who receive badges

would exhibit higher intrinsic motivation compared to online students in the no badges group. The homogeneity of variance was checked using the Levene's test, and the normality of the sample was assessed with the Shapiro-Wilk test. The level of significance for measurements was set at ($p < 0.05$). The analysis revealed that the use of badges during distance learning courses has a no significant impact on the intrinsic motivation of undergraduate students, $t_{(60)} = 0.651$, $p = 0.518$. Online students implementing the training program with the use of badges ($M = 4.56$, $SD = 0.904$) showed similar intrinsic motivation compared to online students who did not use badges ($M = 4.41$, $SD = 0.86$). Therefore, the use of badges during distance learning courses did not affect the intrinsic motivation of online students. In Table 1, the mean value (M), standard deviation (SD), and the t-value with the corresponding level of significance are presented in detail.

Table 1: Mean scores and standard deviations of intrinsic motivation for the badges and no badges groups.

Variable	Badges (n=32)		No Badges (n=30)			
	M	S.D.	M	S.D.	t	p
Intrinsic motivation	4.56	.904	4.41	.86	.651	.518

According to the results, the H01 hypothesis, which suggested that the online students who receive badges will have higher intrinsic motivation than online students in the no badges (control) group, is not supported. Therefore, undergraduate students who received badges during the intervention did not gain more intrinsic motivation from their participation in the distance learning course compared to undergraduate students who did not receive badges (Figure 1).

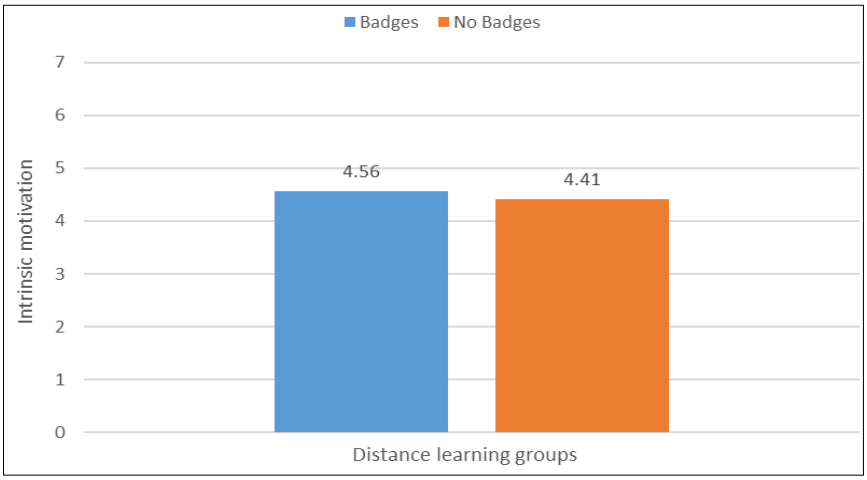

Fig 1: Mean scores of the distance learning groups (badges, no badges) in intrinsic motivation.

Discussion

Understanding how distance gamified learning environments influence learners' motivation is crucial for developing effective gamified distance courses. However, the existing gamification literature presents mixed results on this subject, and scholars widely agree that more research is necessary (Dichev & Dicheva, 2017) [6]. Therefore, the goal of this study was to contribute to the gamification literature by examining the impact of a distance learning environment gamified with badges on the intrinsic motivation of online undergraduate learners. To address this objective, a specific question was formulated and investigated, and the study's findings regarding this question are discussed below.

The research question focused on the impact of a distance learning environment gamified with badges on the intrinsic motivation of undergraduate students. While the hypothesis suggested that participants exposed to badges would show higher intrinsic motivation compared to those without exposure, the data did not support this assertion.

Intrinsic motivation was assessed through self-report, and this method produced noteworthy outcomes. Specifically, the incorporation of gamification tools did not enhance the intrinsic motivation of online learners and did not motivate them to successfully complete the modules or fulfill their needs compared to the control group. Consequently, the course design featuring badges did not contribute to a heightened level of intrinsic motivation among participants in the badges group when compared to the control group.

In accordance with self-determination theory, any external motivators like rewards, threats, deadlines, or imposed goals have a diminishing effect on the intrinsic motivation for tasks that are already inherently motivating for individuals (Ryan & Deci, 2000) [14]. These extrinsic motivators erode existing intrinsic motivation by altering the perceived causality from internal to external factors, such as obtaining a promised reward. Consequently, the initial intrinsic motivation in a person transforms into controlled motivation due to a reduced sense of autonomy and an increased sense of being controlled (van Roy & Zaman, 2017) [15]. Additionally, based on self-determination theory, all anticipated tangible rewards provided for task engagement (engagement-contingent), task completion (completion-contingent), and successful task completion (performance-contingent) significantly diminish intrinsic motivation, as tangible rewards impede personal autonomy (Deci, Koestner & Ryan, 2001) [16].

The nonsignificant effect of badges on intrinsic motivation was found in previous studies (Facey-Shaw, Specht, van Rosmalen & Bartley-Bryan, 2020 [17]; Kyewski & Krämer, 2018 [11]; Mekler *et al*., 2017) [7], leading to considerable debates within the gamification literature. Similarly, badges have faced criticism for replicating the impact of external rewards (Faiella & Ricciardi, 2015) [5]. Therefore, the lack of a significant impact of badges on intrinsic motivation in this study could be attributed to the established evidence regarding the undermining effect of tangible rewards on

intrinsic motivation. The introduction of badges in this study may have induced a sense of being controlled among online learners, leading to a shift from intrinsic motivation to controlled motivation. Despite the researchers' efforts to present badges without implying control, participants may still have perceived badges as exerting control.

Conclusions

In conclusion, this study contributes valuable insights to the gamification literature and informs practitioners engaged in the ongoing discourse on these issues. Despite the primary goal of gamification being to boost the motivation of online students (Dichev & Dicheva, 2017) [6], the findings indicate that badges may not necessarily lead to an increase in students' intrinsic motivation. Moreover, badges fell short in fulfilling the need for competence among online learners. Therefore, practitioners, including online instructors and instructional designers, should exercise caution when implementing badges in a manner similar to the design in this study, especially if their primary objectives include enhancing the intrinsic motivation of online students or fulfilling students' need for competence (Hazan *et al*., 2018 [18]; Mekler *et al*., 2017 [7]; van Roy & Zaman, 2018) [19].

References

1. Means B, Bakia M, Murphy R. Learning online: What research tells us about whether, when and how. Routledge Taylor & Frances, 2014.
2. Michalopoulou M. Distance education at D.U.Th. due to COVID-19, 2020. Accessed 13/10/2023. Available at: https://duth.gr/Επικαιρότητα/εξ-αποστάσεως-εκπαίδευση-στο-δπθ-λόγω-covid-19.
3. Means B, Neisler J. Suddenly online: A national survey of undergraduates during the COVID-19 pandemic. Digital Promise, 2020.
4. Seaborn K, Fels DI. Gamification in theory and action: A survey. International Journal of Human Computer Studies,2015:74:14–31.
5. Faiella F, Ricciardi M. Gamification and learning: A review of issues and research. Journal of e-Learning and Knowledge Society,2015:11(3):13–21.
6. Dichev C, Dicheva D. Gamifying education: What is known, what is believed and what remains uncertain: A critical review. International Journal of Educational Technology in Higher Education,2017:14(9):1–36.
7. Mekler ED, Brühlmann F, Tuch AN, Opwis K. Towards understanding the effects of individual gamification elements on intrinsic motivation and performance. Computers in Human Behavior,2017:71:525–534.
8. Sailer M, Hense JU, Mayr SK, Mandl H. How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. Computers in Human Behavior, 2017:69:371–380.
9. Hanus MD, Fox J. Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. Computers and Education,2015:80:152–161.
10. Banfield J, Wilkerson B. Increasing student intrinsic motivation and self-efficacy through gamification pedagogy. Contemporary Issues in Education Research,2014:7(4):291–298.
11. Kyewski E, Krämer NC. To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course. Computers & Education,2018:118:25–37.
12. Ryan RM, Mims V, Koestner R. Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. Journal of Personality and Social Psychology,1983:45:736–750.
13. McAuley E, Duncan T, Tammen VV. Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. Research Quarterly for Exercise and Sport,1989:60(1):48–58.
14. Ryan RM, Deci EL. Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary Educational Psychology,2000:25(1):54–67.
15. Van Roy R, Zaman B. Why gamification fails in education and how to make it successful. Introducing nine gamification heuristics based on Self-Determination Theory. In M. Ma & A. Oikonomou (Eds.), Serious games and edutainment applications, Volume II. Springer International Publishing AG, 2017, 485–509.
16. Deci EL, Koestner R, Ryan RM. Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. Review of Educational Research,2001:71(1):1–27.
17. Facey-Shaw L, Specht M, Van Rosmalen P, Bartley-Bryan J. Do badges affect intrinsic motivation in introductory programming students? Simulation and Gaming,2020:51(1):33–54.
18. Hazan B, Zhang W, Olcum E, Bergdoll R, Grandoit E, Mandelbaum F, Wilson-Doenges G, *et al*. Gamification of an undergraduate psychology statistics lab: Benefits to perceived competence. Statistics Education Research Journal,2018:17(2):255–265.
19. Van Roy R, Zaman B. Need-supporting gamification in education: An assessment of motivational effects over time. Computers & Education,2018:127:283–297.